DOCUMENT RESUME

ED 306 595 CS 211 847

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TITLE Exploring the Cognition of Reading-to-Write (Reading-to-Write Report No. 5). Technical Report No. 24.
INSTITUTION Center for the Study of Writing, Berkeley, CA.; Center for the Study of Writing, Pittsburgh, PA.
SPONS AGENCY Office of Educational Research and Improvement (ED), Washington, DC.
PUB DATE May 89
NOTE 46p.; For the other reports in this series, see ED 285 206, CS 211 845-853, and CS 211 887.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS Audience Awareness; Case Studies; Cognitive Processes; College English; College Students; Content Area Writing; *Critical Reading; Graduate Students; Higher Education; Prior Learning; Protocol Analysis; *Reading Writing Relationship; Student Reaction; *Writing Processes; Writing Research
IDENTIFIERS *Academic Discourse; Reading to Write; *Writing Strategies; Writing Tasks

ABSTRACT

This study is the fifth in a series of reports from the Reading-to-Write Project, a collaborative study of students' cognitive processes at one critical point of entry into academic performance. This part of the study examines the ways in which college students interpret and negotiate an assignment that calls for reading to write. Subjects, 17 freshmen and 19 junior and senior writing majors and graduate students, thought aloud from the time they began reading the instructions for the task through completion of a first draft. Results indicated that while the subjects varied in age and writing experience, their protocols shared these features: (1) students read through the instructions and source text a first time, making minimal, brief comments; (2) the students reread the text and made longer, more substantive comments; (3) students then engaged in planning their paper by making brief outlines or searching for an organizing idea; and (4) students began to write their papers, either from notes or referring back to the text, or both. (A figure is included and the Reading-to-Write study list of of references and four appendixes of data are attached.) (RS)

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Technical Report No. 24

EXPLORING THE COGNITION OF READING-TO-WRITE

(Reading-to-Write Report No. 5)

Victoria Stein

May, 1989

This Report will appear as a chapter in *Reading-to-Write: Exploring a Cognitive and Social Process*, by Linda Flower, Victoria Stein, John Ackerman, Margaret J. Kantz, Kathleen McCormick, and Wayne C. Peck, to be published by Oxford University Press. An overview of the Study to which this Report refers can be found in CSW Technical Report No. 21, *Studying Cognition in Context: Introduction to the Study*.

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The project presented, or reported herein, was performed pursuant to a grant from the Office of Educational Research and Improvement/Department of Education (OERI/ED) for the Center for the Study of Writing. However, the opinions expressed herein do not necessarily reflect the position or policy of the OERI/ED and no official endorsement by the OERI/ED should be inferred.

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Preface to the Reading-to-Write Reports

> So I'm just gonna--I don't care, I'm just going to interpret them the only way I can interpret them. . . . Let's just put what the authors agreed on. *Authors agree* -- We'll just -- If at least two of them concur, we'll say they agree. *Authors in general agree that. . . .* But then they don't agree -- There's nothing you can say about this. . . .
>
> Can I leave it at that. . . . Oh give me a break, I don't know what I'm doing. I'm only a freshman. I have no idea what to do.
>
> Darlene, a first-semester freshman

Darlene's college assignment asked for synthesis and interpretation. The paper she turned in--a short, simplistic review of material from her sources--failed to meet her own expectations and her readers'. And yet, a chance to look at the process behind this unsophisticated product revealed serious thinking, a complicated, if confused, decision process, and a trail of unused abilities and discarded ideas--an active encounter with academic discourse that her teacher would never see.

The study presented here takes an unusually comprehensive look at one critical point of entry into academic performance. It shows a group of freshmen in the transition into the academic discourse of college, looking at the ways in which they interpret and negotiate an assignment that calls for reading to write. On such tasks, students are reading in order to create a *text* of their own, trying to integrate information from sources with *ideas* of their own, and attempting to do so under the guidance of a *purpose* they must themselves create. Because these reading-to-write tasks ask students to integrate reading, writing, and rhetorical purpose, they open a door to critical literacy. Yet this same interaction often makes reading-to-write a difficult process for students to learn and to manage.

In order to get a rounded picture of cognition in this academic context, the study looks at the thinking processes of these students from a number of perspectives, drawing on think-aloud protocols of students writing and revising, on interviews with and self-analyses by the students, and on comparisons of teachers' and students' perceptions of texts the students wrote. It attempts to place these observations within a broader contextual analysis of the situation as students saw it and the social and cultural assumptions about schooling they brought with them.

What this study revealed were some radical differences in how individual students represent an academic writing task to themselves--differences which teachers might interpret as a simple indication of a student's ability rather than a student's interpretation of the task. The students were often unaware that such alternative representations existed or that they might hold such significance. Some images of the task, for instance, such as those dominated by the goals of comprehension, summary, and simple response, offered little or no place for critical response, original synthesis, or interpretation for a rhetorical purpose.

The reading-to-write task students imagined for themselves also had a direct effect on performance: it affected the goals they set, the strategies they used, and the

ways they solved problems during composing. And it led to differences in teachers' evaluations of the texts--although, this study suggested, these evaluations may confuse the conventions of organization (e.g., use of topic sentences) with the writer's control of ideas. When students began to examine their options and attempt the more demanding task of interpreting for a purpose, certain students, whom we called the Intenders, showed important changes in their writing and thinking process. These changes, however, were not evident in the text and nor apparent to teachers. Finally, this study showed how students' images of the task were rooted in the students' histories, the context of schooling, and cultural assumptions about writing which they brought to college.

It is not surprising to find that some of the images students bring with them are at odds with the expectations they encounter at a university. However, when the expectations for "college-level" discourse are presented in oblique and indirect ways, the transition students face may be a *masked* transition. That is, the task has changed, but for a number of reasons, the magnitude and real nature of this change may not be apparent to students, even as they fail to meet the university's expectations.

One of the key implications of this study is that reading-to-write is a task with more faces and a process with more demands than we have realized. We see students thinking hard and doing smart things, even when they misgauge their goals or their written text fails to meet certain standards. This close survey of the cognitive and social landscape of reading-to-write in a college class gives one added respect for the students in this transition and for the complexity and sophistication of the "freshman" task as they face it.

The Reading-to-Write Project was carried out as a collaborative effort at the Center for the Study of Writing, at Carnegie Mellon. We designed the study to create a range of alternative perspectives on the process of reading-to-write and on the way cognition is shaped by the social context of school. The following technical reports present the design and collaborative history of the study; analyses of the cognitive processes we observed, of the texts, and of students' perceptions of both; and a set of conclusions, from different theoretical perspectives, on how students manage this entry into academic discourse:

Reading-to-Write Report 1.
(CSW Tech. Report 21)

Studying Cognition in Context: Introduction to the Study.
Linda Flower

Reading-to-write is an act of critical literacy central to much of academic discourse. This project, divided into an Exploratory Study and a Teaching Study, examines the cognitive processes of reading-to-write as they are embedded in the social context of a college course.

Reading-to-Write Report 2.
(CSW Tech. Report 6)

The Role of Task Representation in Reading-to-Write.
Linda Flower

The different ways in which students represented a "standard" reading-to-write task to themselves led to marked differences in students' goals and strategies as well as their organizing plans. This raised questions about the costs and benefits of these alternative representations and about students' metacognitive control of their own reading and writing processes.

Reading-to-Write Report 3.
(CSW Tech. Report 22)

Promises of Coherence, Weak Content, and Strong Organization: An Analysis of the Student Texts.
Margaret J. Kantz

Analysis of students' Organizing Plans (including free response, summary, review and comment, synthesis, and interpretation for a rhetorical purpose) also revealed a hybrid plan in which certain coherence conventions gave the promise of synthesis while the paper's substance reflected a simpler review and comment strategy. Both students and teachers, it appeared, may sometimes confuse coherence strategies (for text) with knowledge transformation strategies (for content).

Reading-to-Write Report 4.
(CSW Tech. Report 23)

Students' Self-Analyses and Judges' Perceptions: Where Do They Agree?
John Ackerman

Any writing assignment is a negotiation between a teacher's expectations and a student's representation of the task. Students' Self-Analysis Checklists showed a strong shift in perception for students in the experimental training condition, but a tellingly low agreement with judges' perceptions of the texts.

Reading-to-Write Report 5.
(CSW Tech. Report 24)

Exploring the Cognition of Reading-to-Write.
Victoria Stein.

A comparison of the protocols of 36 students showed differences in ways students monitored their comprehension, elaborated, structured the reading and planned their texts. A study of these patterns of cognition and case studies of selected students revealed both some successful and some problematic strategies students brought to this reading-to-write task.

Reading-to-Write Report 6.
(CSW Tech. Report 25)

Elaboration: Using What You Know.
Victoria Stein

The process of elaboration allowed students to use prior knowledge not only for comprehension and critical thinking, but also for structuring and planning their papers. However, much of this valuable thinking failed to be transferred into students' papers.

Reading-to-Write Report 7.
(CSW Tech. Report 26)

The Effects of Prompts Upon Revision: A Glimpse of the Gap between Planning and Performance.
Wayne C. Peck

Students who were introduced to the options of task representation and prompted to attempt the difficult task of "interpreting for a purpose of one's own" on revision were far more likely to change their organizing plan than students prompted merely to revise to "make the text better." However, the protocols also revealed a significant group of students we called "Intenders" who, for various reasons, made plans they were unable to translate into text.

Reading-to-Write Report 8. **Translating Context into Action.**
(CSW Tech. Report 27) **John Ackerman**

One context for writing is the student's history of schooling including high school assignments and essays. Based on protocols, texts, and interviews, this report describes a set of "initial reading strategies" nearly every freshman used to begin the task--strategies that appear to reflect their training in summarization and recitation of information. From this limited and often unexamined starting point, students then had to construct a solution path which either clung to, modified, or rejected this a-rhetorical initial approach to reading and writing.

Reading-to-Write Report 9. **The Cultural Imperatives Underlying**
(CSW Tech. Report 28) **Cognitive Acts.**
Kathleen McCormick

By setting reading-to-write in a broad cultural context we explore some of the cultural imperatives that might underlie particular cognitive acts. Protocols and interviews suggest that three culturally-based attitudes played a role in this task: the desire for closure, a belief in objectivity, and a refusal to write about perceived contradictions.

Reading-to-Write Report 10. **Negotiating Academic Discourse.**
(CSW Tech. Report 29) **Linda Flower**

Entering an academic discourse community is both a cognitive and social process guided by strategic knowledge, that is, by the goals writers set based on their reading of the context, by the strategies they invoke, and by their awareness of both these processes. As students move from a process based on comprehension and response to a more fully rhetorical, constructive process, they must embed old strategies within new goals, new readings of the rhetorical situation. However, for both social and cognitive reasons, this process of negotiation and change that academic discourse communities expect may not be apparent to many students for whom this becomes a confusing and tacit transition.

Reading-to-Write Report 11. **Expanding the Repertoire: An**
(CSW Tech. Report 30) **Anthology of Practical Approaches**
for the Teaching of Writing.
Kathleen McCormick *et al.*

One important implication of this entire study is that students themselves should come into the act of examining their own reading and writing processes and becoming more aware of cognitive and cultural implications of their choices. This set of classroom approaches, written by teachers collaborating on a Reading-to-Write course that grew out of this project, introduces students to ways of exploring their assumptions and alternative ways of represent aspects of the task.

Acknowledgments

Our heartfelt thanks go to our colleagues John R. Hayes, Karen A. Schriver, Nancy Spivey, Tom Huckin, Christina Haas, Lorraine Higgins, Stuart Greene, Tim Flower, Stephen Witte, Mike Rose, Gerald Rutledge, and Kathy R. Meinzer.

EXPLORING THE COGNITION OF READING-TO-WRITE

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In previous reports we have explored the complex and highly variable nature of the reading-to-write task. Students may have differing representations of this task that in turn may affect the processes they bring to bear upon performing it. Similarly teachers' representations of the task may differ from their students', yet they may be unaware of this difference and therefore they may not be giving students the kind of instruction that may enable them to do more highly valued forms of the task.

Since reading-to-write tasks are frequently assigned at all grade levels, the average college freshman has had a great deal of experience with them, the kind of extensive practice that often leads to the development of strategies and procedures for getting the job done (See Report 8). As part of our investigation into the nature of reading-to-write tasks, we wanted first to know what kinds of cognitive processes students routinely brought to bear on this task. We also wanted to discover more about the ways in which the cognitive systems of reading and writing (often explored independent of each other) interact during such a task. Would reading strategies affect writing process? Would writing goals affect the way students read source texts?

In order to learn more about the cognitive acts underlying the process of reading to write, we examined protocols of two groups of subjects performing the Time Management task described in Report 1. One group consisted of 17 of the freshmen who participated in the teaching phase of this study. The second group was comprised of 19 junior and senior writing majors and graduate students enrolled in Carnegie-Mellon's Master of Professional Writing program. This group had acted as pilot subjects for the Time Management materials. The text they received had one additional paragraph, deleted in the freshman version to reduce length. Both groups were asked to think aloud from the time they began reading the instructions for the task through completion of a first draft. Their comments were recorded and then transcribed verbatim. These protocol transcripts are the basis for the study described in this report.

While the two groups vary in age and writing experience, their protocols share some important features. With four exceptions, the overall patterns of processing are the same: The students read through the instructions and source text a first time, making minimal, brief comments (an average of 2.2 lines of protocol transcript). These comments either indicate comprehension work in the form of gisting or questions or contained off-the-cuff responses to the text. More often than not, they merely indicate agreement or disagreement with the source text ideas. Sandy's protocol provides some examples. In these excerpts, sentences from the source text are underlined; notes and writing appear in bold face; the actual comments appear in plain type:

> "The average worker has two kinds of "prime time" to plan: external time and internal time. External prime time is the best time to attend to other people. Internal prime time is the period in which one works best. Scheduling large blocks of time in advance helps organize the work day. That's true. I do that--try to do that anyway...."

"He advocated continued concentration in the face of apparent mental fatigue: 'The fatigue gets worse up to a certain critical point, when gradually or suddenly it passes away, and we are fresher than before. We have evidently tapped a new level of energy.' Alright, wait a minute. So in other words, you get energy from putting away a sufficient amount of time. Let me go back...."

These students then went back and read the source text a second time. In this second pass reading, comments become more frequent and much longer (more than twice as long, an average of 5.7 lines of text as compared to 2.2 lines in the first pass reading). The function of the comments changes as well. Students began testing the assertions of the source text more carefully, comparing them with their own experiences in similar situations, conditionalizing them, stating reasons for agreement or disagreement at greater length. Here, for example, is Jack during his second pass reading:

"The students surveyed said they use strategies like these to minimize the debilitating effects of long range pressures. They assume that they will understand the subject matter sooner or later and that inspiration will be on hand when they need it. I don't...that doesn't make sense to me. If you have...what's the difference between long range pressure and many, many short range pressures? I think that's definitely worse. If you have a long range pressure you can work it out... you've a lot longer time. If you just put it off, you'll never get it done. And assuming you've got inspiration, that's a very bad strategy..."

Following this second reading, these students then engaged in some planning for their papers. Such plans could include rough outlines of key points to include, search for an organizing idea, and more rarely, discussion of the audience for the paper. Here is Toshi, working out his major premise:

"Now what's the main point of this? What should I try to do? Well, basically, what is the main theme? What should I say in my statement? Well I suppose I could say **many of these suggestions seem sensible**. Well, yes, they do seem sensible. Every one except the last one tends to...or give good advice. However, accomplishing these is a problem, so I guess...**accomplishment is not always possible**. That **should be manageable**. So I think that's basically what I would say..."

Following such planning, students then began to write their papers, either working from notes or referring back to the source text or both.

Four students, one graduate and three undergraduates, followed a somewhat different path. These students generally read the source text through only once, with longer comments, many of which became actual text. Only one of these students engaged in any planning and revision of text written during that one reading.

The 36 protocols we gathered went through several analyses. First, we identified four categories of cognitive processing that supported both reading and writing behavior: Monitoring, Elaborating, Structuring and Planning. Then we looked at the way students applied those processes in some important areas within the task:

1) as they built representations of meaning of the source text and then of their own texts

2) as they brought prior knowledge into the reading process

3) as they applied automated processes and practiced strategies to the task

4) as they tried to balance the development of ideas and opinions with constraints of the task.

These qualitative analyses had two goals: To see what cognitive processes students used to realize their representations of the task, and to explore the relationship of cognition to context, as manifested in the expectations and knowledge they brought with them and in the current task. Finally, we performed a quantitative analysis whose purpose was to investigate possible correlations between use of certain cognitive processes and the types and quality of papers our students produced.

AN EXAMINATION OF COGNITIVE PROCESSES

The four categories of cognitive processing we established derived from two sources: The literature on cognitive processing in reading and writing, and examination of pilot protocols. We sought first to establish broad categories that would delineate the major patterns of activity. These included:

•Monitoring

•Elaborating

•Structuring

•Planning

Monitoring: Experts monitor either comprehension during reading or progress with a task overall because it enables them to identify problems with processing (cf. Baker & Brown, 1984; Newell & Simon, 1972). We believed that monitoring would play an especially important role in reading-to-write because it would allow us to see how students took exigencies of various contexts into account. For example, instances of task monitoring would enable us to see how conflicting contextual goals (e.g. "Synthesize relevant findings" vs. "Find something interesting/new to say") are handled. Instances of comprehension monitoring (such as paraphrasing, restating gists) would show not only how representations of the meaning of the source text are handled, but also the way in which students imported propositions from the source text into the text they were writing.

Elaborating: Elaboration--that is, production of meaning-enhancing additions (Levin, 1987)-- is the principle means by which students bring what they already know into the reading (Reder, 1980; Hamilton, 1987) and writing (Benton et al., 1984) processes. In fact, it is through the process of elaboration that we see the clearest indication of how the constructive processes of reading and writing interact, as prior knowledge combines with source text propositions to create new ideas and critical perspectives (cf. Kucer, 1985; Spivey, 1987. See also Report 6).

Structuring: How students shape and reshape material gleaned from source texts is a significant part of the process of moving from reading to writing (Kintsch & Van Dijk, 1978; Meyer et al., 1980; Langer, 1984.) We hypothesized that when

students had to deal with multiple, perhaps only partially connected, source text propositions, structuring activities would play an even more important role in the creation of a new text. In this category, we looked for any activity in which a subject began to manipulate propositions in a source text to begin forming a new text. Such activities include looking for instances of agreement and disagreement between propositions in source texts or between a proposition in the source text and the student's prior topic knowledge, looking for superordinate categories under which to subsume items in the source text, arranging text into high-level and low-level propositions, and discovering relations between ideas in the text that may not have been apparent on reading alone.

Planning: Planning plays a central role in moving from reading to constructing a text of one's own. However, experienced writers performing tasks like ours rely much more heavily on planning than inexperienced writers (Burtis et al., 1983) and they construct more fully elaborated and integrated plans (Flower et al., 1986). In the context of this task, we wanted to see how students went about constructing a text of their own. We looked to see how they dealt with content, i.e. ideas from the source text or from memory; how they dealt with text features, from single sentences to whole paragraphs; how they developed organizing ideas to guide the construction of the text; and how they developed a sense of rhetorical purpose of their own.

Clearly there is some overlap in these categories. For example, a student may need to elaborate in order to discover connections between ideas in the source text; monitoring comprehension in the form of restating gists from the source text may be an integral part of dealing with content while planning. In such cases, double coding was used to account for the overlap.

Figure 1 shows the results of this coding. The coding categories run across the top of the grid. The paper type (using the categories outlined in Report 3) run down the left side. The protocols were first parsed to differentiate between reading, rereading, writing and commenting. Comments were then marked off as episodes, ranging from a single sentence to over two pages of transcript. In earlier research on the internal structure of the writing process, we found that although these goal-directed episodes are complex units of thought, they are reliably visible to judges and they account for underlying logic and structure and timing of the composing process in a way that other patterns such as paragraphs or the topic do not. (Flower & Hayes, 1981b) We defined an episode as an instance in which a student was primarily engaged in one activity, such as planning.

	Monitoring	Elaborating	Structuring	Planning	Total # Episodes	Total # Students
Summary	27	34	9	10	80	2
Review & Comment	148	205	52	99	504	11
R&C +Frame	31	65	22	40	158	5
R&C + Main Pt.	145	236	55	98	534	12
Controlling Concept	13	21	14	16	64	2
Interpre-tation	36	42	7	17	102	2
Free Response	23	53	3	4	83	2
Totals	423	656	162	284	1525	36

Figure 1: Distribution of process categories across paper categories

As the chart indicates, these students devoted the most of their time (43% of all episodes) to elaborating, i.e. comparing source text ideas to their own knowledge of time management. Twenty-seven percent of the remaining episodes were devoted to monitoring comprehension, 19% to planning and only 11% to structuring the information at hand. This trend does not change noticeably with paper type. Those students who construed the task as knowledge-telling (summary/response categories 1-4) divide their processing time by precisely the same percentages. Those invested in knowledge transformation (synthesis and interpretation) vary slightly, with 38% of their episodes devoted to elaboration, 30% devoted to monitoring, 20% to planning and 13% to structuring. Those writing free responses, which rely less heavily on source text ideas and more on prior knowledge, spent fully 64% of their time elaborating, 27% monitoring comprehension, 5% planning and 4% structuring.

These trends suggests that elaboration played an important role in performance of this task. A more detailed exploration of the impact of this kind of processing can be found in Report 6. It should be noted, however, that these students were writing on a topic they had a fair bit of knowledge about, which may account for the reliance on personal experience. Also, the source text purposely lacked certain conventions of coherence, so students may have turned to structured memories and experiences as a source of coherence. Even so, these students also paid close attention to the source text. All in all, a total of 60% of all episodes were dedicated to gathering information

from the source text and from memory. Those involved in knowledge transformation spent a little more time on planning and structuring.

It would be difficult to say whether the distribution of effort over these categories represents an unusual reliance on information gathering. To be sure, for the reasons stated above, this particular task invited more elaboration and comprehension monitoring. It may also be the case that in general proportionately less planning and structuring is the norm. At the present time, there is not enough data on the way writers use these four processes in reading-to-write to compare these figures to.

To what end would students use these four major processes? One hypothesis that we could draw from expert/novice studies is that variables such as the quality of writing and the type of paper written (e.g. summary, synthesis, interpretation) can be predicted by the frequency with which students use certain strategies that reflect these processes. In other words, the students who perform tasks more successfully are more likely to use these strategies more often. Later in this report, we shall present our attempts to investigate such connections. On the other hand, reading-to-write assignments are complex tasks, in which students juggle myriad goals and constraints as the processes of reading, writing and task representation impinge upon one another. Our analysis, therefore, was designed to also consider a rival hypothesis: that strategy use would be context-bound. That is to say, the frequency with which a student used a given strategy would not depend upon reading or writing expertise alone; rather, the way in which a student defined a task, the way in which a student chose to solve a problem, the nature of a student's plans and goals, and the constraints created by the way in which students pulled information together would all affect where, when and how often a student would apply a strategy (cf. Flower, Hayes et al., 1986). The case studies that follow are meant to illustrate the contextual and strategic processes we observed.

THE COGNITION OF READING-TO-WRITE: A CASE STUDY PERSPECTIVE

It seems clear that reading-to-write tasks make a unique set of demands on students. A typical reading-to-write task requires a student to be able to read and comprehend a number of different materials on a given topic, materials that may have different orientations and different information on the topic. The student must then be able to sort out the similarities and differences in the source materials, figure out how to apply her own prior knowledge, decide what she feels is important to write about, determine what kind of paper will best suit her approach to the topic and materials and then attend to the usual set of demands that any writing task makes.

The reading-to-write assignment constitutes, therefore, an enormously complex task environment, which incorporates a plethora of smaller tasks and goals, each of which changes with context. Changing contexts and goals often lead to differences in the way people use basic processes, as well as in the kinds of papers they write. Such a view suggests that as students perform this kind of task, they make choices about which cognitive processes to use and when to use them. That is to say, contextual constraints may require students to use different strategies for monitoring, elaborating, structuring and planning at different times, tailoring their use to the immediate needs of the task. In effect, then, students must "manage" (Schoenfeld, 1979) the application of strategic knowledge, making decisions about which strategies to use when.

The case histories below are intended to shed some light on how students manage or fail to manage this process in four different areas of the reading-to-write process. These areas include:

1) Moving from the source text to new text,

2) Applying prior knowledge,

3) Using practiced strategies

4) Balancing creativity with contextual constraints.

These are four areas that call for strategic choice, and within them, we found that students handled decision-making quite differently, although the extent to which students were aware of the choices available to them varied. They put the processes of monitoring, elaborating, structuring and planning to use under very different goal structures, and in doing so created very distinctive process histories in the ways they used their own cognitive resources. A case study perspective highlights the interplay between strategic decision-making processes and reading and writing processes.

Moving from Text to Text

Students had trouble generating coherent texts of their own when they could not first assemble source materials into a unified coherent whole during the constructive process of reading. In other words, they needed to build a representation of the texts they were reading in order to build a representation of their own text. The complexity, difficulty--and importance--of this process can be seen in the protocols of Darnell, Claudia and Darlene.

DARNELL: Darnell's protocol is short, only 8 pages (as opposed to an average length of 12-15 pages for most of our subjects). As he begins the task, he does what almost everyone else does--he reads the text on time management, interjecting evaluative comments on specific sentences, working out small comprehension problems. His evaluative comments are not unlike comments made by others--assessing the feasibility of various assertions about how to manage time, stating agreement or disagreement, drawing on his backlog of personal experience to see how his time management technique compares with those written about in the text. This kind of evaluation, for many of our subjects, served as a way to make decisions about what material to use from the text, because once they deemed something irrelevant or unworkable, they chose either to drop it or use their evaluative comments as the basis for their text. For Darnell, this is not the case. His evaluation of the source text gives him no clue as to how to manage it.

This is apparent as he begins his second reading of the text, claiming "I'm going to have to do a lot of rereading because I don't think I remember half of this stuff....Let's see...Every little thing had a different thing about time management...." In this second reading, he sets about extracting gists for each paragraph, using none of his evaluative material. When he is done, he has a bare-bones list of gists, one for each paragraph. At this point, he ponders the task: "And I wonder what else I'm supposed to do for this assignment...Ok I have to make my interpretation...my statement about time management...ok what is my statement going to be?" He looks over his notes and finally writes a single sentence--"**Time management such as daily schedules are necessary for quality work that is meaningful to a person.**" This sentence is a distillation of most of the gists he's extracted. Since he has not used his critical powers to help him construct a more fully elaborated, connected image of what is being said in this text, he has nowhere to go after that. This is apparent in his comments after he finishes writing his sentence: "Really, it' s hard to make one basic statement, because there's like eight or nine different things that these people have said and that they mean, that they're trying to get across..I don't

know...." He tries listening to his own protocol and decides that he sounds like "some illiterate jerk but God I can't come up with any statement whatsoever..." He returns to his list of gists, notes that he has four ideas but can't figure out where to go with them. He rereads the task instructions and then decides "There's nothing I'm going to be able to do in this...I really don't know...I guess we're going to leave it at that."

What contributed to Darnell's failure to generate more than a single sentence? Among other things, he was apparently unable to build a substantive representation of the material he had to work with. What strategies might have helped him to do this? A closer look at his protocol suggests a few:

As Darnell read the material for the first time, he made quite a few elaborations and in doing so he generated a wealth of material whose value he clearly did not understand. For many other students, elaborative material was a gold mine. Elaborations that determined relevance enabled them to drop out material altogether, letting them skirt the issue of having to make connections between seemingly unconnected items. Also, such evaluative comments helped them make decisions about what kind of paper to write--that is, realizing that they disagreed with some of the advice given in the source text, they decided to use points of agreement, embellished by personal experience, as the structure for their own texts. Inferential embellishments, in which causal connections and scenario-building allowed students to see the implications of some of source-text advice, gave students a critical perspective on the topic and source text. Similarly, instantiations allowed students to flesh out bare-bones assertions enough to become discussable. Darnell did all of these things as he read the source text the first time. But apparently, he underestimated the utility of this kind of thinking.

Another kind of activity that might have proved useful to Darnell, but that he didn't use at all, was structuring. Whereas he was able to pull out basic gists, he hardly even tried to discover what the connections between these gists might be. The source text had a number of contradictions embedded within it at the global and local levels. Working with these contradictions enabled some students to begin to see how things were and were not connected in the text. Darnell hardly noticed the local contradictions, and missed the global contradictions altogether. Nor was he able to find top-level organizers that might have helped him categorize the different assertions in the source text. Because he failed to do any of this, the source text remained an unmanageable morass of floating ideas, leaving him nothing to build his own text on.

In this context, the relationship between text and task is an important one. Students who come to an early understanding of what kind of paper it is that they'd like to write seem to have less trouble building a representation of the source text because demands of certain paper types dictate the way in which they will deal with source materials. For example, knowing early that you want to do a summary or synthesis carries with it the knowledge that you will have to find ways to account for all the material, which in turn seems to trigger strategies that will allow you to do so, such as structuring, categorizing, and gisting. Similarly, deciding that making a statement means some kind of personal response seems to trigger strategies for applying personal knowledge.

Yet, deciding on a certain task early is not always a guarantee of success in building text representations. Students may also have to understand that it is sometimes necessary to change tasks in order to get the job done. Claudia's protocol gives us an example of this phenomenon.

CLAUDIA: After a first pass much like Darnell's, Claudia quickly began writing, with the intention, apparently, of writing a summary with comments based on her elaborations thrown in: "**Time management. There are many different opinions on time management. They vary from James who tells us to work past fatigue and reach a new level of energy. If we waited and worked toward this new level of energy we would probably all have died from waiting. On the other hand Guitton says we should rest at the first sign of fatigue. If we did this we'd never get anywhere.**" But this approach doesn't seem to leave her anywhere to go ("Well, this is not enough, I have to write some more...") so she begins again: " **'Time management is important'**" OK. So what?" She rereads parts of the source text and then expresses dissatisfaction with her approach: "I wish I could get an angle on this. How am I going to do this? Why do I want to do this?" The source of her dissatisfaction appears to be her inability to build an adequate text representation: " This data is garbage. Nothing fits together. This one's about students, this one's backwards, this one's forwards." Soon she realizes that a different approach is in order, one necessitating a change in task from summary to response, and she writes: **"Time management is relative to each individual. That is to say, everyone has a different interpretation. My opinion of time management differs from most of the experts quoted in the passage."** As she continues, she uses most of the material she generated before, but this time has no trouble fitting it into the structure of a response. Changing tasks helped her find a way to manage the material in the text.

These protocol excerpts show us a lot about the power of representation of both task and text. Both of these students were unable to write texts of their own because they were unable to make the source text work for them in an organized way. One, Claudia, found a way around the problem by working instead on her representation of task. In these instances, however, switching tasks meant falling back on review plus commentary as a means of avoiding the problematic source text. What of the student, however, who seems adept at synthesizing, who has a more highly articulated awareness of the power of task representation, yet still cannot work it out?

DARLENE: Such a student is Darlene. Her teacher had identified her as one of the best students in the class, conscientious, motivated and bright. Yet she seems to have had difficulty with this task. Her protocol, which runs to over 30 pages (more than twice the mean), shows she worked very hard at this task. For all that work, however, she was able to muster only a single paragraph on how she was unable to do the task. What happened to Darlene?

"How in the heck can you write a two-page statement about time management when they didn't tell you anything about time management?" she asked after her first reading. Upon hitting the interpret prompt, she wondered, "How can you interpret it? None of it's the same." She reread the task instructions several times after the first pass. She looked up the word "synthesis" to be sure she understood what it means, and focussed on the word "comprehensive." Yet, after her third rereading of the task instructions, she decides that she will "just treat this like a journal...and write a statement," dropping entirely the notion of comprehensiveness.

Then she goes back to reread the source text, elaborating plentifully as she goes along, noting key points and points of agreement. But when she's done rereading, she again feels stymied by the source text: "I don't know what I have to write, I have to write something about time management...I'm just doing it as a journal, I don't care what I'm supposed to do. Let's just start off something about what I read." However, what she writes is not about what she read. It's about the trouble she's having fulfilling the assignment as she understands it: **"While doing the protocol on time**

management I had a hard time writing a comprehensive statement about time management because the notes I read didn't help."

She starts a list of key points. However, "these notes just don't do anything" for her. "I don't even know what I'm supposed to be doing. I feel like such a wuss." So she makes a synthesizing move, trying to find "factors that influence performance." But working with the individual statements in the source text proves to be too frustrating and she finally says, "All right, forget it, I'm gonna give it another shot....I'm just doing a journal."

Her very next move, however, is to read the task instructions again, focussing on the directive to "interpret and synthesize all of the relevant findings in the text." Ultimately she says " so I'm just gonna--I don't care, I'm going to interpret them the only way I can...." but rather than begin her journal entry, she resorts to yet another synthesizing move, deciding to write about what the authors (not she) agreed and disagreed about. Unfortunately, this foray into synthesis proves unsuccessful too. Finally she looks at the one sentence she has written and changes it: "**I had a difficult time writing a comprehensive statement about time management because the notes I read did not seem to make a clear statement to me**," saying "it's not that they didn't help, because I guess they helped. They didn't write the essay for me is the problem."

And so it goes. As she writes, she purposely determines to "go for vague words," as if underscoring her inability to deal specifically with the source text. After writing about instances of agreement between authors, however, she stops again and her frustration is evident: "Oh, I don't know! All I have is a half page of notes. How can I possibly make this into anything? I'm not doing well, but I don't know why."

She then tries to go "from the authors to [her]self. I have to write something that I feel." She writes **"To me it is obvious that organizing your time is an intrinsic part of time management. After all isn't that what management means?"** But when she returns to synthesis, looking for "opposites," the old frustration pops up again: "Can I leave it at that....oh give me a break, I don't know what I'm doing, I'm only a freshman, I have no idea what to do..." She ends by writing:

> **"I have tried to incorporate these ideas into my statement but I have been wandering in circles long enough. To continue to struggle for words would not be an efficient use of time and wasting excessive amounts of time does not seem appropriate, especially on a paper about time management."**

Certainly, Darlene's confusion about what task to do is apparent in her paper, which, read in its entirety, is a curious amalgam of synthesis and response. But what is perhaps more interesting is the fact that Darlene's paper is really not on the topic at all. It is instead a comment on the cohesiveness of the source text and her frustration with it. Darlene tried her best to find ways to make it all fit together, to do the synthesis task she thought she was supposed to do. Whereas she had an acceptable alternative, the response mode (called a journal entry by her teacher), she seemed unwilling or unable to commit herself to one task or the other.

Darlene marshalled considerable cognitive resources toward performing the task, yet she still came up short. What was missing from Darlene's repertoire? One move

she didn't make, that expert writers in similar situations may make, is to move at this point to active problem solving, focussed on one's goals, alternatives, or the task itself.

Darlene's protocol points up an important aspect of strategic knowledge: Simply knowing a few strategies is often not enough. You must also know when to apply them and recognize when they are failing you.

Applying Prior Knowledge

Prior knowledge has a number of uses in reading-to-write tasks. Use of formal topic knowledge or general world knowledge can foster development of critical thinking, aid in generation of new ideas and development of old ideas, and it can support the processes of monitoring, structuring and planning. (For a fuller discussion of the application of prior knowledge in reading-to-write, see Report 6). As such, therefore, application of prior knowledge can be a powerful strategy that shapes both reading and writing processes. However, as with any complex cognitive move, context will enhance or constrain the effectiveness with which prior knowledge can be applied, and that means that students must develop some awareness of when and how it is appropriate to apply it.

As the following case histories show, some students use this valuable strategy with rigor and energy. At the same time, however, Connie and Elvin were unable to monitor their use of strategic knowledge, in this case, elaboration. Their inability to recognize that application of particular prior knowledge was inappropriate to the context of the topic and the source text almost subverted their attempts to do the task.

These students are both candidates for the degree of Master of Arts in Professional Writing whose training in empirical research methods has provided them with specialized knowledge which includes precise definitions for certain terms and knowledge of the criteria for validity in such research. As they read the source materials, they immediately focussed on the words "data" and "research." These terms apparently called up knowledge about research, including evaluative criteria, that they then tried to apply to the source text. The problem was that those criteria, and the reading strategy that they suggested, were inappropriate for this task and that text.

CONNIE: This disparity caused a big problem for Connie. In her very first comments after reading the source text she asks, "Why do they call it research notes?" Like the students above, she is having trouble seeing how the text "hangs together," apparently because it violates her expectations about what research notes should be. After rereading the first paragraph, she says "Now, what I'd like to know is, how did [the author] come to these conclusions? Did he observe a lot of people, did he do questionnaires?" She reads the second paragraph and wonders "Where did James get this stuff? Is it just his personal experience? What is the basis for his data? Too much acid in college? Did he do a scientific experiment, a repeatable experiment? Control group?" She continues to read the next couple of paragraphs, doing some elaboration, but seems to be having difficulty with the text. The source of her frustration appears to be her sense that the text does not live up to the expectations engendered by the words "data" and "research." This is apparent after she rereads the fifth paragraph, when she wishes the author had provided more specific instances (i.e., proof) of his ideas, and she writes "What was the nature of his research?" She says, "I mean, they never tell us how they did it. What method did he use? I could put that down for all these guys. I mean was this scientific research? Or was it mostly just opinions?"

She makes comments such as these after every paragraph that she reads, and her comments more often than not become notes. However, Connie never generated any

text beyond those notes, and never reconciled the reality of the text with her expectations of what she thought it would be. Unable to let go of those expectations, she never focussed on the substance of the text itself.

ELVIN: Similarly, Elvin initially found his expectations tripping him up. After reading the source text, his very first comment is "I was expecting more statistical data when I read the title." He begins to reread the text but soon wonders "exactly which data I'm supposed to be interpreting." Shortly thereafter, in the middle of rereading a paragraph, he says "What I'm supposed to do is a statement about time management based on this data. And I still don't know which data I'm supposed to be interpreting, and I'm going to have to go back to the beginning again." But unlike Connie, he is able to get off dead center. After rereading the first sentence, he says "Maybe I'll relate the data collected...data collected is always, data, data. Data. I don't think that's the right word for all the instances cited." He is able to let go of his strict definition of the word to be able to apply it to what is actually in front of him. He writes, "**data collected from authorities, professional settings and data collected from academic environments,**" and says "So I think I'll set up a contrast between professional settings and academic environments..." and thereafter is able to come up with a plan, that allows him to focus on the content of the source text.

The protocols of Connie and Elvin highlight an important facet of strategic knowledge. Students may have developed strategies and evaluative criteria from their experience as writers and from their studies of a specialized field. But the development of such cognitive resources may be only the first step toward mastery of strategic knowledge. Students must also become sensitive to the context in which they apply these strategies. They must develop the kind of metacognitive awareness that will allow them to test for the appropriateness of application of a strategy; they must also make adjustments when the context of the text or task does not allow for successful application of a particular strategy.

Automated Processes and Practiced Strategies

Some students seemed to have no trouble with this reading-to-write task. They moved from reading to writing with consummate ease, and appeared to have a well-established set of questions, criteria and moves. Yet, as many teachers can attest, the fact that a student can do a task easily does not mean that she can do it well. In fact, as the case histories below illustrate, practice does not always make perfect; it can just as easily reinforce bad habits.

The terms "automated processes" and "practiced strategies" as they are used here refer to well-rehearsed procedures that students have to some extent internalized. As mentioned before, most students have had years of experience with reading-to-write tasks, assigned by many different teachers with many different goals and in many different contexts. Often students do such tasks in one shot, perhaps because of time constraints, perhaps because they are not motivated to spend more time on them. Whatever the case, we hypothesized that students have had ample opportunity to figure out strategies for doing such assignments and rehearse them so often that using those strategies no longer demands much conscious attention--they have become tacit, procedural knowledge (cf. Anderson, 1983). In such cases, familiar task representations, and procedures for pulling together and packaging information would be used out of habit, almost as default processes. Use of such automated processes and practiced strategies would considerably streamline the reading-to-write process.

All of the students described below appeared to rely on sets of well-rehearsed procedures to one extent or another. They also all wrote the same kind of paper--one

our raters called summary with a frame, in which the student provides a general topic statement in the first paragraph, provides examples in subsequent paragraphs, and closes with an iteration of the topic statement. Their protocols, therefore, give us some insight into how such processes yield this kind of paper, which closely resembles the five-paragraph theme; they give us some perspective on how the use of such processes affects paper quality, since our subjects' texts received quality ratings of between 1.5 to 3 on a scale of 3; and, perhaps most importantly, they show us the downside of using such procedures, especially for planning and monitoring activities.

PATRICE: Patrice moved from reading to writing with hardly a pause for breath. During her reading of the text, she makes minimal comments, most of them in service to comprehension monitoring. She reads the task only once, and then, after a glance at the first sentence of the text which seems to situate her in the topic, starts generating text:

> "Ok, so well, let me see...Time management of course is, well , it is of importance...it's of great interest to...people today because...I want to say that in today's society things move so quickly and there's so much to be done that every minute counts...so people are always trying to get the maximum done with minimum effort...like with computers, you can do so much more with them...so um okay **'time management is of great interest in today's society, a society which seeks maximum production and efficiency with the least amount of effort'**...they make it sound so easy to plan your time, it's not...**'These studies make it sound easy to plan your time, to divide it between external and internal prime time.....'"**

This excerpt from Patrice's protocol is highly representative of how she went about writing this paper. She never stopped to make an overall text plan; rather, using elaboration to give her angles, she recaps portions of the source text, making comments about them as she goes along. For example, here is how she handled the third paragraph of the source text, which she moves to after she rereads what she's already written about the first:

> "**'Walter Pauk's study is...**' really just common sense...is, it's not like it's some big discovery...I mean everybody knows about...everyone knows that you have to concentrate when you're in school, and that you can't concentrate if you've got like, loud music blaring in the background or anything...And if you don't have enough time...um...**'Walter Pauk's study doesn't really say anything that most college students don't already know'**...they may not practice what...they may not..I want to say...I mean, they know they should schedule time and that they should have a nice quiet environment, but it doesn't mean they practice it. They may not follow...**'They may not follow his advice, but they know it's true.'"**

The rest of Patrice's protocol and essay are very much the same. She seems to have learned some conventions of form well: She writes a nice topic sentence that prefigures her attention to what people say and do about maximum efficiency with minimum time expenditure. She has a nice, if obvious, conclusion that ties it all together (**'Obviously student strategies are inefficient, but will they ever change?'**) She accounts for most of the authors in the source text (for some reason, she seems to have skipped over James). By using her comments as a means of evaluation, she has found something beyond the source text to talk about. This knowledge of these conventions allows her to breeze along.

But there are other things that she didn't do, that others did do, that might have improved her paper, which received a quality rating of 1.5. She never really monitored the task, asking herself "Is this enough?" or "Is this the best way to do this" which might have lead her to a more formal kind of task representation (such as synthesis). Such a representation might have allowed her to use her critical evaluation more effectively. Nor did she posit an audience, a move that would have allowed her to develop a rhetorical purpose for what she was writing. And she never did any planning, except at a local level. Global planning may have given her a way to build more connections, dig deeper into the material, thus permitting an even closer, fine-grained analysis. Patrice was clearly able to elaborate effectively on a sentence by sentence basis. Pulling back and looking at the material from a greater distance might have let her use her elaborative skills even better.

GRACIE: Gracie's paper received a quality ranking of 2, and an examination of her protocol reveals some interesting similarities and differences between her approach to this task and Patrice's. Like Patrice, she begins writing immediately, and like Patrice she is a prodigious elaborator who reaches quick closure. And again, as with Patrice, the move to quick closure prevents her from doing a better job of integrating the source material. In Gracie's case, the rapid application of practiced strategies in service to quick closure proves even more problematic as it leads to miscomprehension in some instances. But unlike Patrice, she does invest in some global planning which gives her paper a somewhat clearer focus than Patrice's.

Gracie's notes, as she begins to read the source text, read more like text than fragmented notes. They include not only items from the source text, but also her elaborations. For example, here is Gracie's reading of the first paragraph:

> " Time management...the key to success according to efficiency expert Alan Lakein in his recent book HOW TO GET CONTROL OF YOUR TIME AND YOUR LIFE LIES IN PACING AND PLANNING'...**Time management...How one goes about planning their use of time in the most efficient manner'**...He notes that planning is decision making, and that it is imperative that decisions on using time to best advantage be made'...so **'If you don't use time wisely you'll never succeed at anything'**..There are two kinds of prime time to plan: external and internal'...two kinds of prime time...so...**'time can be divided in two ways, internal and external...both help to organize the workday...every individual has a different time management because every individual spends time differently.'"

There are several items of interest here: First, Gracie, preoccupied with using elaboration to build context for localized source text propositions, is generating text as she reads, not notes, but real, substantive text that gives her quick (perhaps premature) closure on the topic. For example, the idea that "every individual has different time management because every individual spends time differently" is a conclusion that most other subjects reached after spending a lot of time trying to get the pieces of text to fit together, and it became the focus of their writing, their topic sentence in effect. Gracie gets the picture early, but this valuable perspective is buried, obscured, because it is not used in a more global planning episode. Second, note how far she leaps in her elaborations. "It is imperative that decisions on using time to best advantage be made" becomes "if you don't use time wisely you'll never succeed at anything." These leaps indicate a lack of critical control, an inability to monitor the appropriateness of the material she generates.

Soon Gracie's drive for quick closure reaches almost comic proportions, as her efforts result in the kind of convoluted logic that make teachers wonder whether to laugh or cry. For example, she treats the student strategies at the end of the text, which many students recognized as being in complete contradiction to the advice of the experts, as if they were just as reasonable as the others:

> **"Each of these deals with the allocation of time...one...first of all you do what's due and postpone big projects. This way you don't do what's not due and do what's due. That way you get it out of the way and the pressure is relieved. Or you create a crisis which pressures you to get the assignment done, or you get all the easy stuff out of the way...By doing this you've spent the time wisely and have more time for the harder assignments. Next you allow the minimal estimate of time it will take to get a project completed. I guess they're saying not to allocate more than enough time to one project because you have less time to complete the others...If you allow the minimal estimate of time then you'll know how to budget the time better and have time to do more than if you spend all you time on one project. Finally students find that you shouldn't read material more than once and you shouldn't try to remember it until it's needed....I guess by constantly rereading material you tend to confuse yourself and you may forget it...and spend too much time trying to memorize it before you get it down on paper."**

When Gracie has finished writing this series of text/notes, however, she takes a next step, one that Patrice, in her rush to closure, fails to make. Gracie makes a conscious investment in planning and structuring. First she attempts to get a handle on the topic overall:

> "Time management...the way in which some budget their time is founded on many factors ...Management of time is based on many factors...oh brother...Ummmm....Time management is...Time management is needed so that every student expends all of their mental energy to complete every assignment...If the student does not know how to budget their time correctly, then there's no way they can complete the assignment or produce quality work..."

Like Patrice, Gracie is searching for the topic sentence that will set up the rest of the paper. But unlike Patrice, Gracie doesn't settle on the first one. She keeps generating them until she gets to one she likes. She begins with a very general one, a paraphrase of the source text, and moves slowly toward one that gives her a specific focus, namely students. It also sets her up with a problem statement of sorts, albeit a veiled one: Why do students need time management? Because they won't do good work if they don't have it.

Whereas Gracie's repertoire of automated processes and practiced strategies appears to include a greater awareness of the value of planning and structuring, it still lacks the vital element of critical control. It is as if the emphasis is on the local management of propositions, and not on the development of a better understanding of the content of the source text at a more global level. The importance of a more global approach to comprehension and planning is exemplified in Leslie's protocol.

LESLIE: Unlike Gracie, Leslie shows active critical control, and makes use of the value of monitoring and planning. She is able to use this knowledge purposefully and effectively.

Leslie resists the impulse to quick closure. She reads the text and instructions once without comment. Before she reads it the second time, she wonders about the purpose of the text: "Now, I'm supposed to write a statement about time management based on interpretation of this data...Ok this passage is supposed to help students--give tips on how to improve study skills by arranging their time more efficiently." Her first reading has helped her get a handle on task and text: she understands the task to be interpretation and has a feel for the rhetorical intent of the source text. In her second reading, since she has a sense of what she wants out of this text already, she is also able to make valuable relevance judgments. For example, reading about Lakein's notion of internal and external prime time, she says:

> "Now this is what is unclear...How does that relate to the whole? This concept of internal and external prime time? I'm supposing that when he says 'scheduling large blocks of time' he's referring to internal prime time, which is the 'period in which one works best.' [she makes a note of this]...well now that I think about it , perhaps 'scheduling of large blocks' doesn't refer to internal prime time but to both and that...what you are supposed to do is set specific periods of time for dealing with other people and specific periods of time for working. But I still don't, after reading this before, I don't think that this concept of external prime time and internal prime time is relevant at this time."

After she has finished rereading the text, she stops to make "some observations that I've made reading this....:

> we've got two different environments that we're talking about: professional and academic settings. In looking at my notes, two paragraphs speak specifically about academic performance. So I'm going to write down academic performance and underline it, and I'm going to write down the studies. Pauk, and I'm going to write factors that affect next to his name. Then the other one was student survey. I'm writing down strategies for overcoming poor study skills. The next thing I'm going to write is general performance and in parentheses academic or professions. I'm going to underline it and write down all the studies that fall into this category...."

Having noted specific differences and similarities in the ideas put forward by the source text authors, Leslie now engages in some more global planning:

> "Ok, so I've classified the studies according to what they're talking about...Now I'm going to break these up under different criteria here. We have factors that affect...some studies have factors that affect performance versus strategies for managing time...ok now some of these studies can fall in both categories...factors that affect performance---Pauk. Well, they're factors but they're also strategies: ability to concentrate, knowing how to study. I mean implicit in those are strategies. Actually you could list all of these in terms of strategies, instead of just saying factors. What we can separate by is not factors versus strategies but strategies for improving time management versus strategies for coping with poor time management skills."

But Leslie's planning does not stop with the arrangement of content into workable categories. Her next move is to find her rhetorical purpose:

> "Why is [time management] important? Who cares? Why is it an issue? Ok, I'm going to use the last paragraph as the problem statement: I want to answer the question, why research on time management? And the answer I'm going to give to this question is people tend to use ineffective strategies..."

Leslie has walked a very controlled path here. She takes the time to read the text carefully, to decide on the task, to find a good focus, to set up the problem statement, and to make sure to apply her criteria for success at every step of the way. In doing so she combines a wide range of strategies that include important moves for planning and monitoring.

Balancing Creativity and Context

The students discussed so far have been intent on staying on task. Some have been more successful at producing papers than others, but they have all made persistent attempts to deal with the material they were given on its own terms. All of us, however, have at one time or another, received papers from students that seem so far off the mark that we wonder if they even bothered to read the assignment. How do students get off topic and off task?

This is the story of Travis, a Master's student whose paper was so far off the topic of time management as discussed in the source text that he might have been working on a different task altogether. This paper, which presented an extended metaphor on the thinking process, was rated as a "free response" by the raters. Given the indeterminate nature of this task, such a response was not necessarily inappropriate. Writing about a completely different topic was. Yet, a look at Travis' protocol shows that his journey from time management to thinking did indeed start with his consideration of the source text. A multitude of larger contexts, however, greatly influenced his odyssey through the process of reading-to-write. These contexts, unlike those explored earlier, are not defined by the task or those assigning it; they are defined by the person doing the task, who he is, where he's been. In Travis' case, the demands of those contexts proved to be more powerful than the demands of the task.

TRAVIS: Prior to graduate school, Travis had gone to a small liberal arts college. According to him, most of his previous writing experience had been largely within the expressive writing tradition, with its emphasis on personal reporting, journals and self-discovery. The graduate program he chose to enter, however, offered three semesters of intense training in professional and technical writing, with emphasis on identification of design and audience needs for technical documents such as computer manuals. Students are expected to write papers analyzing information in order to find the best way to present it, and they are also expected to analyze their own writing processes, in order to adapt them to various writing situations.

Travis had a hard time adjusting to the writing demands of the program overall, and to the specific requirements of the professional writing class in which he was given the time management assignment. He told his teacher that he found it very difficult to write analytic papers, indeed even to think analytically. His protocol provides ample evidence of this. It presents a compelling portrait of a student unable to put his mind to the task.

In person, Travis is a compulsive talker with a quick mind, given to fanciful leaps of imagination, facile turns of phrase and off-the-wall free association in the manner of stand-up comics. Some of this is evident as he begins the task. For one thing, he seems extremely aware of the odd circumstances under which he's doing the task, virtually playing to the tape-recorder microphone ("We're going to open up the envelope here, folks ...babble insanely for a while...") As he reads the source text for the first time, he makes notes of some gists and the like, but most of his effort goes into putting the assertions in the text into his own context by instantiating and free associating. Like Gracie, Travis is a prodigious and free-ranging elaborator. For example, when he comes across the sentence "**Time can be gained by combining activities which by themselves do not fully occupy all of a worker's capabilities.**" (from the one additional paragraph in the Masters' students' task materials described earlier) his response is, "I guess that means multiple..energy...if something is mindless you can put it together with other mindless tasks. This is sort of like cooking." This cooking analogy proves to be very seductive, with power enough to shape what will happen later.

Travis reads the source text through a second time, with the intent of doing a closer reading. The more he tries to concentrate on the task, however, the more difficulty he seems to have attending to it. For example, as he reads the task instructions he muses:

> "What's my statement. Is my statement...uh...criticism about how they're doing it? Or is my statement about how I would go about doing it if I had my act together. Which I do not..getting your act together is a very important thing, ladies and gentlemen..having it together...and of course, none of us ever has their act together...until we die, as Flannery O'Connor...Flatulence O'Connor would say...what a Christian hero she was..."

Although he rereads the task instructions once later on, he never again attempts to define for himself what the task ought to be. In fact he seems more intent on subverting the task. After he made the comments cited above, he read a few more source text sentences, and then decides:

> "I know, I'll say everything that I'm writing in a French accent, then I'll know when I'm playing this tape back, where I'm writing down... Hey coolness...Ok well I gotta make sure I'm not speaking in a French accent when I'm not writing something down....I'm such a funny guy (reads another sentence)...Ok when I'm reading, I'll do it in a German accent...

Shortly thereafter, finally back on task, he decides it would be "a good idea to just go down this list and write my impressions of each point." This switch in emphasis from source text to his own impressions seems to trigger even more extreme elaborative behavior. For example, on reading that college students often "create a crisis" he wonders:

> "Why would you want to create a crisis? To artificially induce labor, no, to artificially create a pressure situation because that is the way you believe to focus your energy...because you're too scared to be apathetic and easily distracted...OK, I'm distracted right now, my bum hurts...and I'm going to have to read this out loud or someone's going to be looking at this...they'll realize what a dangerous person I really am. PLEASE DON'T LET ME KILL AGAIN...(rereads note about apathy and distraction)...But to me when I'm in that situation I become more distracted than ever. I'm

beginning to sound like Steve Martin. I become more distracted than ever, thinking 'Oh my goodness, I have so much pressure on me...'"

The cooking analogy reasserts itself sentences later. When he gets to "**Read material once; don't try to remember it until it's needed**" he says:

> "Yeah, that's like the crock pot situation. We're making a stew..ok...that's a good way of putting it...making a stew...we take information as vegetables...and meat...for all you vegetable rights activists, we take information...can see information as vegetables..and..let it stew..let it cook..we let it cook, we let it simmer, and the best way to do that is to gather your information, take notes on info so that you're concentrating on the information at first hand ...and in the process of writing stuff down and jotting notes, your brain is actually recording it, I assume. Maybe I'm making the brain more wonderful that it is, but that's what I think is going on.. and then..go on to planning and the daydreaming, letting the veggies of your mind, the information, that is, stew slowly and create new flavor combinations with each other...."

It is important to recognize that Travis is not merely fooling around in an attempt to avoid the task. To be sure, there are clearly moments when his attention seems to be wandering. But there are also moments, as the excerpt above shows, when Travis is working very hard, engaging not so much in critical thinking as the term is applied to analytical academic tasks as he is in creative thinking. That activity provides him with a metaphor powerful enough to control his thinking, reading and writing processes, which in turn will affect the focus of his final paper. However, while the work and the effort he puts into expanding this metaphor is admirable, it seems to be missing one important component: awareness that his metaphor will soon lead him off topic altogether, away from time management and onto creativity.

Shortly thereafter, while rereading the source text, he notes that "I did think of a good cooking metaphor pretty early." Later, rereading his notes, the power of the metaphor is again reinforced: " ...**You create a crisis in order to artificially create a pressure situation. Because you believe that is the most time-efficient way in which to concentrate and focus, because you're too scared to be apathetic and distracted...**like a pressure cooker."

Then he deems himself ready to write. He goes first to look again at the student strategies, focussing on the sentence "**Students report the following for getting through assignments**" and wonders "Are these written assignments or regular projects. We'll treat this as writing assignments...writing assignments...can be thought of ..as making a stew." And so he is off and running. He is hereafter consumed with the desire to work out the cooking metaphor as best he can: "**We are making stew when we write. We take information (information as vegetables) and let it cook. Take notes on info, so that you are concentrating on info at first. And then go onto planning and daydreaming, letting the veggies of your mind stew slowly and create new flavor combinations. That is, let your mind make the combinations somewhat unconsciously."**

It is perhaps not surprising that Travis was unable to stick to the topic, given the amount of effort he put into running away from the source text. In essence, Travis seems to have reinvented the task so that it looks less like a standard academic writing assignment and more like the kind of writing he feels more comfortable doing. In the context of that kind of writing, which is often used as a tool for self-discovery, it is

quite acceptable to use the source text as a leaping off point to get to something more meaningful to the writer himself. This task, in contrast, required students to write about other people's ideas. Travis' previous writing experience, as well as his personal style, overrode demands of the task per se. The result is a final product that would puzzle any teacher expecting to read a paper on time management.

LOOKING FOR PATTERNS: THE QUANTITATIVE ANALYSIS

These case studies give us a sense of the delicate interplay of the independent cognitive systems of reading, writing and task representation in reading-to-write tasks. We see that the comprehension work during reading affects the ability to write later on. We see that the way in which a student chooses to represent a task influences both his reading and writing behavior. We see that writing goals, such as being comprehensive, or including one's owns opinions, similarly affect reading and task representation.

Further, we see that the families of strategies encompassed by our four coding scheme categories--monitoring, elaborating, structuring and planning--serve crucial, and often very different purposes at different points in the reading-to-write process. For example, a student might apply a host of monitoring strategies while reading: She may have to make sure that she understands what is being read; that whatever prior knowledge she applies via elaboration is appropriate for the task at hand; and that the information she gleans from her reading and elaboration will help her reach her writing goals. That is to say, various contexts--e.g. kind of subtask, nature of previous experience, different types of writing goals--affect strategy use.

The first and foremost goal of this study was to map in some detail the certain points of interaction between task, process and context. As the exploratory study progressed, however, two rival hypotheses developed. One, the so-called "frequency hypothesis", stated that the number of times a student uses a specific process can be correlated with such dependent measures as type or quality of paper, and that definitive relationships between amount of process use and specific outcomes can be described. The second hypotheses, called the "strategic knowledge" hypothesis, stated that these processes are best seen as strategies and that strategy use is not directly related to outcomes such as paper type or quality, but rather to goals, plans and task representation.

The qualitative analysis just presented allowed us to explore this second hypothesis; hence its preoccupation with the interaction of strategic knowledge and context. However, such an analysis has some important limitations. It could only give us single instances that could not be used to generalize about relations within the group as a whole.

In order to test the frequency hypothesis, that is, to see the relation between students' use of these cognitive processes and the papers they generated, a quantitative analysis was also performed. Independent raters were asked to assess the papers our students produced from two perspectives: They were first asked to make a determination about the structure of the papers, using the rating system described by Kantz in Report 3. After the papers were assigned to categories, different raters assigned quality ratings to the papers. The scale for these ratings was 1-3, with 1 indicating poor quality, 2 average quality, and 3 high quality. The raters were instructed to assign quality rankings within groupings; that is to say, quality of a paper was judged relative to other papers having that organizing plan.

Pearson Product Moment correlations comparing the numerical counts of process use to quality, paper type ranking and expert/novice status were performed, as were

several regression studies. None of these analyses yielded significant results. That is to say, this analysis established no clear relationship between the number of times a student used a particular process and the kind of paper he eventually wrote, or the quality of that paper. For results, see the Notes in Report 6, Appendix 1.

While such results may lead one to reject the frequency hypothesis, disconfirmation of it has to be taken with caution, for it may well be more accurate than this analysis reveals. That the quantitative analysis did not reveal any definitive patterns between process use and specific outcomes may be attributable to the scope of this study. In our analysis we had a relatively small number of subjects (36) and a relatively large number of paper type categories (7). Since the majority of our subjects (28) wrote some papers that fell into two of the summary + comment categories, there were not enough students writing the other kinds of papers to establish clear patterns of interaction between the number of times a student used processes and the type of paper she produced.

However, we do not believe that the frequency hypothesis, at least a simple version of it, will prove correct. One reason is that our subjects often used combinations of strategies in order to reach a goal. For example, a student might elaborate in order to find the kind of connections between propositions necessary for structuring. Such combinations of strategies prove to be quite powerful for many students. But the value of the process depends on the current goal.

We also found that a large number of our subjects were what Wayne Peck (See Report 7) calls "intenders." These are students who believe they are writing one kind of paper (e.g. a synthesis) yet produce a paper rated to be something else (e. g., a summary). In this context it is important to note that 28 our of 36 papers were rated as some form of summary, yet it is clear from the protocols that many students thought they were doing something else. That these students produced papers that went contrary to their intentions may be attributable to a number of reasons: They may not have had sufficient command of particular strategies whose use, in different ways, may have been important to both kinds of papers. They may not have had sufficient knowledge of strategies to produce a certain kind of paper. Or, as above, they may have had trouble and switched tasks without necessarily realizing that they were doing so. The frequency hypothesis, which assumes that we can predict process based on the final product, fails to account for the shifting goals and strategies we saw in these intenders.

It also became apparent that the frequency with which a student used a particular strategy was related to the ease with which students were able to do the task. If a student had relatively little trouble deciding what kind of paper to write, managing the reading and doing the writing, he probably used these problem solving strategies less often than his peer who had a lot of trouble with this task and had to marshall more cognitive resources to help her solve problems. Quite often a student having difficulty with the task, as shown above, may change task representations or reading strategies. But such changes would not necessarily be reflected in a statistical analysis.

When taken together, the quantitative and qualitative analyses provide converging evidence that the number of times a student applies a strategy may be less important than the context in which she applies it. Students must use strategies for monitoring, elaborating, structuring and planning throughout the reading-to-write process, but how, when and where they apply those strategies is going to depend on the way in which they define the task and the way in which reading and writing goals impinge upon each other. While neither the qualitative nor quantitative analysis should be read as definitive in and of itself, together they allow us to build a better data-based hypothesis about the

way these students used these kinds of strategies to work through four important junctures in this task.

This perspective underscores the need for development of metacognitive awareness in the performance of reading-to-write tasks. Students need not only strategies for reaching goals, but also knowledge of the relationship between goals and strategies. Such knowledge will enable them to look more critically at their armories of strategies, to engage in the kind of problem solving that will enable them to use the right strategy at the right time. This in turn may greatly facilitate the process of reading-to-write.

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Appendix I

Summary Statistics*

Total Observations: 36

	PT	G	Q	TOTEPIS	ELAB
N OF CASES	36	36	36	36	36
MINIMUM	0.000	0.000	1.000	16.000	2.000
MAXIMUM	7.000	1.000	3.000	130.000	43.000
MEAN	2.472	0.556	1.875	54.167	18.611
STANDARD DEV	1.682	0.504	0.637	25.295	9.601

	WP	STR	MC
N OF CASES	36	36	36
MINIMUM	0.000	0.000	0.000
MAXIMUM	36.000	19.000	13.000
MEAN	8.417	4.611	2.833
STANDARD DEV	8.069	4.871	3.203

*Summary statistics show means and standard deviations. The three dependent variables are:

Paper type (PT)
Group (G)
Quality (Q)

The five independent variables are:

Total number of episodes in the protocol (TOTEPIS)
Number of episodes in which student elaborated (ELAB)
Number of episodes in which student made writing plans (WP)
Number of episodes in which student structured ideas (STR)
Number of episodes in which students both elaborated and monitored comprehension (V). Episodes in which students only monitored comprehension were not included in the analysis.

Appendix II

Pearson Correlation Matrix*

	PT	G	Q	TOTEPIS	ELAB	WP	STR	MC
PT	1.000							
G	-0.015	1.000						
Q	0.244	-0.178	1.000					
TOTEPIS	0.033	0.080	0.126	1.000				
ELAB	0.141	-0.131	0.071	0.616	1.000			
WP	-0.089	0.230	0.033	0.497	0.068	1.000		
STR	-0.096	0.3000	0.071	0.595	0.059	0.638	1.000	
MC	0.169	-0.419	0.396	0.166	0.042	-0.026	-0.153	1.000

* Pearson correlation matrix shows no significant correlations. (See Appendix X for complete variable names.)

Appendix III

Multiple Regression Results*

DEP VAR: PT N: 36 MULTIPLE R: .236 SQUARED MULTIPLE R: .056
ADJUSTED SQUARED MULTIPLE R: .000 STANDARD ERROR OF ESTIMATE: 1.736

ANALYSIS OF VARIANCE

SOURCE	SUM OF SQUARES	DF	MEAN SQUARE	F-RATIO	P
REGRESSION	5.534	4	1.384	0.459	0.765
RESIDUAL	93.438	31	3.014		

* Multiple regression results using paper type as the dependent variable, elaboration, writing plans, structuring and monitoring comprehension/elaboration episode counts as independent variables.

Appendix IV

Multiple Regression Results*

DEP VAR: Q N: 36 MULTIPLE R: .424 SQUARED MULTIPLE R: .180
ADJUSTED SQUARED MULTIPLE R: .074 STANDARD ERROR OF ESTIMATE: 0.613

ANALYSIS OF VARIANCE

SOURCE	SUM-OF SQUARES	DF	MEAN-SQUARE	F-RATIO	P
REGRESSION	2.552	4	0.638	1.700	0.175
RESIDUAL	11.635	31	0.375		

* Multiple regression results using quality as the dependent variable, elaboration, writing plans, structuring and monitor comprehension/elaboration episode counts as independent variables.